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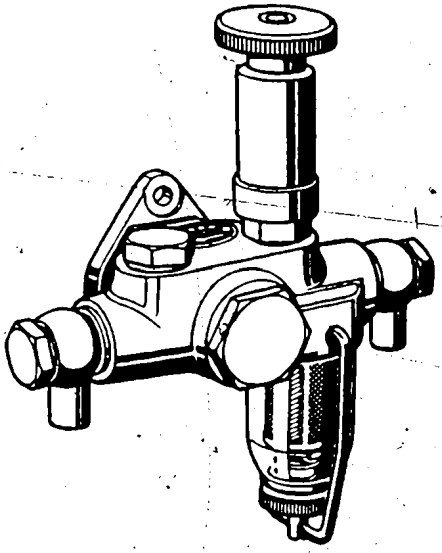
VDT-WPP 411/1 B F

TESTING INSTRUCTIONS

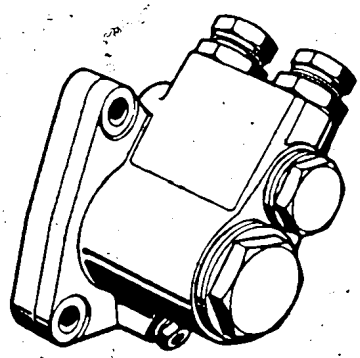


FP/K.. 0440... ...

Feed Pumps

FPUE.. 2447... ...

FP/AH.. 0440... ...



FP/KLA.. 0440... ...

ROBERT BOSCH GMBH STUTTGART GERMANY

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1. General Remarks

In many cases after a complaint is made it is necessary to test the feed pump on the pump test bench. These test instructions give information on locating defects.

1.1 Test Benches

Feed pumps can be tested on all pump test benches (EFEP 25, EFEP 5.., EFEP 120, EF 8500, EF 8346 and older designs). If test benches of older design are used, an additional testing device will be required (EF 8196, filter with pressure gauge and throttle cock). The pressure gauge and throttle cock are built into more recent test benches.

1.2. Driving Devices

If the feed pumps cannot be tested on the associated injection pump, a special clamping and driving device is required. In the following table we list these devices for the different types of feed pumps:

Feed Pump	Stroke	Driving Device	Part Number
FP/K 16 and 16 A	8 mm	EF 8514 A	0 681 244 002
FP/K 22 B.. and BV..	10 mm		
FP/KE 22 A..	8 mm		
FP/KS 22 A..	8 mm		
FP/KS 22 A 10 and ..13 (without roller tappet)	8 mm	EFEP 159 B	0 681 240 027
FP/K 22 M..	7 mm	EFEP 195	. ...
FP/K 22 P..	4 mm Double cam	EFEP 395	. ...
FP/KD 22 ZC, ZV and ZW	12 mm	EF 8291	0 681 244 001
FP/KLA	4,8 and 7 mm	EFEP 195 or EF 8514 A with shaft EFEP 178...	1 686 101 000
FP/KLA	4,8 mm Double cam	EFEP 395.....	. ...

1.3. Other Equipment

Measuring glass 1 litre capacity (usual commercial type)

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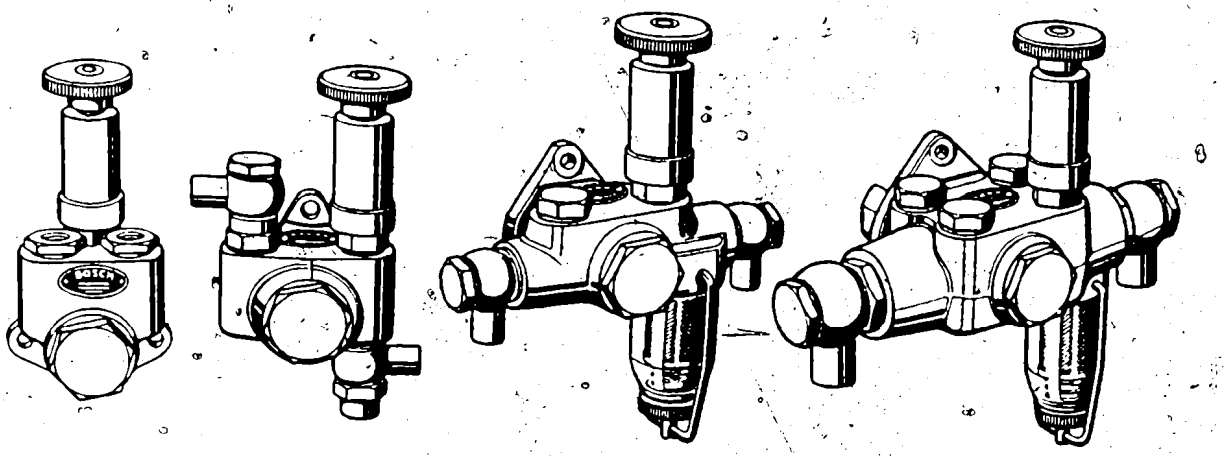
1.4. Test Conditions

Suction line: 10 x 1 mm; 1.2 m (4 ft) long, suction height 1 m (3¼ ft).

In the case of test benches EFEP 25, EF 8500 and older models, a suction line is built in which together with the feed hose EF 8456/23 A (from the trough to the feed pump) meets test condition requirements.

Test bench EFEP 5 C has a suction line of larger cross section. Consequently other values apply for this test bench when testing suction capacity.

		Part Number
Test oil	OI 61 v 11	
Filter	FJ/AF 11/3	0 450 200 003
with relief valve 0.5 m (1½ ft) above filter	PVE 53 P 12 Z	1 457 413 016
Pressure gauge	0-6 atm. (0-85 psi) (on test bench)	



2 Testing feed pumps FP/K..

2.1. Visual Inspection

Using a socket wrench, unscrew the screw plug from the piston and valves and check:

whether the valves are properly seated,

whether the valve springs are in order,

whether the roller tappets, plunger spindles and plungers can be moved backwards and forwards easily without visible play,

whether the plunger spindles and plungers have been damaged by impurities in the fuel.

In the case of feed pumps with O-ring packing also check:

whether the O-ring is correctly fitted and whether it is worn,

whether the plunger spindle can be moved backwards and forwards easily without sticking.

2.2. Leakage Test

Wash out thoroughly the feed pump housing and the individual components and assemble the clean parts again after having oiled them lightly.

Connect the compressed air line with the reducing valve on the suction side and close the opposite side.

Set the prescribed pressure and place the pump in an oil bath.

Test pressure:

4 atm. (57 psi) for feed pumps FP/K 22 M... without O-ring packing
2 atm. (28.5 psi) in the case of all other feed pumps.

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In the case of pumps **without O-ring packing** light air bubbles must emerge from the roller tappet bores. All other points must be free from leaks.

Pumps with **O-ring packing** must be completely free from leaks when the plunger spindle is moved to and fro. Air bubbles must not emerge from the roller tappet bores.

2.3. Pressure Test (not to be carried out in the case of pumps FP/KD..)

If no faults are found when the visual test is made or the leakage test is carried out, the feed pump must be attached to the appropriate injection pump or to the suitable driving device. Before coupling the driving device to the test bench, the driving device must be cranked by hand with the coupling half, in order to check whether the stroke of the device corresponds with the feed pump which is under test.

Connect the test filter, pressure and suction lines.

Oil cycle: oil tank – suction line – feed hose to feed pump – (fuel filter FJ/AF 11/3 with relief valve PVE 53 P 12 Z) – change-over cock with throttle valve and pressure gauge (to position "Test feed pump") – measuring glass.

Open fully the throttle valve on the change-over cock or the throttle cock on device EF 8196.

Drive the feed pump at rated speed (600 r.p.m.) and allow to run until fuel is fed correctly. Bleed air properly from the filter.

Continue to run the feed pump, close the throttle valve or the throttle cock slowly and measure the feed pressure.

Test values

Feed Pump	atm.
FP/K 16	1.5 – 2.2 (21.2 – 31.5 psi)
FP/K 22, KE 22, KS 22 and K 22M	2.5 – 4.5 (36 – 64 psi)
Feed pumps with strengthened plunger spring	Min. pressure 4.5 (64 psi)

Open throttle valve slowly

2.4. Suction Capacity Test

Open the throttle valve, release the suction line, screw pressure line completely off. Run the test bench at low speed until no more fuel is ejected.

Set the speed prescribed for testing the feed pump, connect the suction line (this can be done while the test bench is running) and measure the suction time. The times indicated are maximum values which must not be exceeded.

Test values

Feed Pump	Speed r.p.m.	Suction time for test bench EFEP 25 in sec.	EFEP 5 C in sec.
FP/K 16	200	50	100
FP/K 22, /KS.. and/KE	100	60	120
FP/KD	100	25	50
FP/K..M	120	60	60
FP/K..P	100	50	100

2.5. Delivery Test

When ascertaining the condition of the pump plunger, delivery measurement "against pressure" is especially favourable and is always to be recommended in doubtful cases.

Measurements at 1000 rpm must only be carried out in doubtful cases, when delivery measurement at 100 rpm has not been fully satisfactory.

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Drive the feed pump at the prescribed speed with the suction and pressure lines connected. Make sure that the filter is properly vented.

Set back-pressure at the throttle valve to the requisite level and measure delivery.

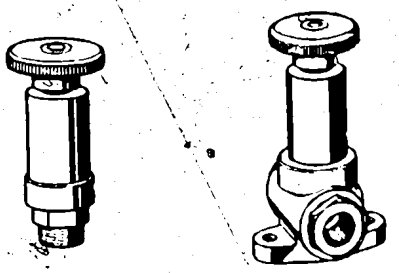
N.B.: Different values will be obtained for feed pumps with preliminary strainer and feed pumps without preliminary strainer.

In the case of delivery greater than 1000 cm^3/min. (61 cu.in./min.) measure only for a shorter period and reduce delivery accordingly (e.g. instead of 60 seconds 2700 cm^3, 20 seconds 900 cm^3). The delivery values shown are minimum values.

Test Values

Feed Pump	Speed rpm	Test time sec.	Back pressure atm. (psi)	Delivery without pre-strainer cm^3	Delivery with pre-strainer cm^3
FP/K 22 B FP/K 22 BC FP/K 22 BVC	100 1000	60	1 – 1.1 (14.2 – 16)	320 2700	
FP/KE 22 AD	100 1000	60	1 – 1.1 (14.2 – 16)	230 1600	230 2000
FP/KS 22 AD	100 1000	60	1 – 1.1 (14.2 – 16)	270 2000	270 2200
FP/K 22 P	100 1000	60	1 – 1.1 (14.2 – 16)	270 1600	270 1800
FP/KD 22	200 600	15	1 – 1.1 (14.2 – 16)		270 800
FP/K 22 M	100 1000	60	1 – 1.1 (14.2 – 16)	135 1100	

After testing, screw off and empty the feed pump, check the roller of the tappet for damage.



3. Hand operated pumps FPUE... and FP/AH..

3.1 Visual Inspection

The pump barrel must not be damaged. The plunger must run smoothly; running must not be rough at any point.

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2. Leakage Test (only in the case of FP/AH..)

Connect the pump on the suction side to compressed air through a reducing valve, close the pressure side, unscrew the pump handle, set the test pressure, immerse the pump in an oil bath up to the top edge of the barrel. No air bubbles should emerge from the barrel and the threaded connectors. A drop in pressure from 2 to 1 atm. (28.5 – 14.2 psi) in 5 sec. is permissible.

3.3 Suction Test

It is best to test the hand pump FP/UE on the test bench with the associated feed pump.

Release the suction line and drive the feed pump at a low speed. Unscrew the handle and operate the hand pump at 60 - 100 strokes/min.

In the case of hand pump FP/AH only the suction line of the test bench must be connected.

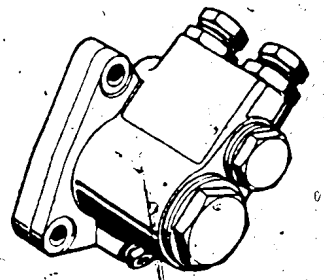
In the case of FP/AH1/4 to test suction capacity, unscrew vent screw.

The hand pump must deliver test oil on the pressure side.

Single acting pumps after max. 25 strokes, in the case of EFEP 25
after max. 50 strokes, in the case of EFEP 5 C

Double acting pumps after max. 33 strokes, in the case of EFEP 25
after max. 66 strokes, in the case of EFEP 5 C

The plunger of the hand pump must run smoothly without roughness or scratching at any point, and must no be retracted by a vacuum.



4. Feed pump FP/KLA..

4.1. Design of Pumps

Plunger pump with very low clearance volume, leakage stop, for 6.8 – 7.0 mm stroke (in special cases also 4.8 mm), plunger and drive tappet as single unit. Tappet spring forces plunger against cam or eccentric drive. Suction valve in plunger opens at bottom dead centre. Pressure valve – designed as plate type valve – is opened by plunger at top dead centre. Spring-loaded compensating plunger after pressure valve to reduce pressure peaks in delivery stroke.

4.2 Visual and Preliminary Inspection

Check pumps for external damage.

Check whether the pump plunger can be moved backwards and forwards easily.

If the pump plunger together with the tappet has to be removed for examination, the auxiliary tool must be introduced as described in VDT-BMP 411/6 before the safety screw is removed.

Check whether the pump is provided with heat protection plates and the correct shim plates (see VDT-BMP 411/5).

Remove the screw plug for the compensating plunger and check whether the plunger can be moved easily without the spring; then screw together again and tighten the screw plug well.

Blow compressed air in at the inlet socket. It must flow out again at the pressure connection piece.

4.3. Test of Leakage Stop

Connect the leakage stop connection of the feed pump to the nozzle tester, and bring pressure to 10 atm. (142 psi).

Pressure drop from 10 to 5 atm. (142 - 71 psi) minimum 5 sec., maximum 15 sec.

4.4. Leakage Test in Oil Tank

Tighten all the screwed joints well; place dummy cover on pressure connecting piece and leakage stop connection. Connect pressure line to suction connection of feed pump. Blow in compressed air through reducing valve at 6 – 7 atm. (85 – 100 psi) and immerse the feed pump in an oil bath. Air bubbles should emerge only at the tappet opening for a test duration of 60 seconds.

4.5. Suction Test

Attach pump to driving device with the appropriate insulation and shim plates, tighten the screws evenly. Fill the driving device with oil, until the camshaft is submerged.

Connect the suction line of the test bench.

Drive the feed pump at the prescribed minimum speed.

Suction time at 100 rpm max. 50 sec. in the case of EFEP 2S
Suction time at 100 rpm max. 100 sec. in the case of EFEP 5 C.

4.6. Measuring Delivery

Connect feed pump pressure line to test oil filter. Run test bench at 100 rpm. until feed pump operates free from air. Then measure delivery at the prescribed speeds.

Test Values

Feed pump FP/KLA	Rated speed rpm	Sec.	Quantity cm^3*	Pressure atm. (psi)	Remarks	
K 1 and K 2	500	15	240	1.9 – 2.2 (27 – 31.5)	Eccentric drive	
K 3, 6, 7, 9 and 11	500	15	360	2.0 – 2.2 (28.4 – 31.5)	Two-lobe cams	in the case of single-lobe cams, double the time
B 8	200	60	1350	0	Two-lobe cams	
P 12	100	60	225	1.0 – 1.1 (14.2 – 16)	Two-lobe cams	
K 10	100	60	180	1.0 – 1.1 (14.2 – 16)	Eccentric drive	

* The delivery values are minimum values.

4.7. Leakage test while running

Drive the feed pump at 100 rpm., clean the outside with trichlorethylene and compressed air and dry. Test oil must not leak out at any point.

Pay special attention to the barrel-locking pin and the cylindrical pin for the delivery valve seat.

Stop the drive and screw off the feed pump.

4.8 Final Test

Check whether the plunger still moves correctly, and that the roller of the tappet is undamaged.

37 KDA

Only for use within the Bosch organization. Not to be communicated to any third party.

Modification to prefilter in supply pumps 0 440 00 . . – FP/K . .

VDT-I-440/101 En
2.1978

In supply pumps 0 440 00. . fitted with a prefilter, unfavourable manufacturing tolerances may cause compression spring 2 454 642 000 to be over-compressed between the sight glass and polyamide filter with the result that the filter buckles. This spring should no longer be used.

Please scrap your stocks of spring 2 454 642 000 and submit warranty claims in the usual manner.
Order 2 454 642 001 as replacement springs.

Warranty claims

Please submit in the usual manner, stating the following:

Part number of defective component:	0 400 999 999
Date of manufacture:	999
Defect number:	10
Date of purchase or registration:	00 00
Date of failure:	11.77
GA	8
Part number of replacement:	2 454 642 000

Please order replacement compression spring 2 454 642 001 in the usual manner.

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